

This report focuses on analyzing airport and air space capacities for various airport runway configurations under consideration to accommodate projected commercial aviation traffic growth in the Bay Area out to the year 2020. The findings presented in this report are based on new analyses as well as information from other aviation studies that have been completed over the last several years. The report discusses analytical tools, critical issues, and effects of proposed runway solutions.

The modeling was used to assess capacity and delay based primarily on existing airspace procedures and it was not the purpose of the analysis to explore any redesign of the airspace.

1.1 BACKGROUND

The Bay Area has three commercial carrier airports: San Francisco International Airport (SFO), Metropolitan Oakland International Airport (OAK), and San Jose International Airport (SJC). Passenger traffic at all three airports has increased dramatically over the last 10 years, growing from about 21 million enplaned (boarding) passengers in 1990 to more than 32 million enplaned passengers in 1999. Aircraft operations (comprised of commercial passenger, all-cargo and general aviation) for all three airports have also been increasing steadily, though at a slower pace, rising from about 1.13 million operations in 1990 to about 1.26 million operations in 1999.

Passengers and operations are projected to grow in the future, therefore an assessment is needed to quantify the impacts of projected (“unconstrained”) demand on the three airports in terms of runway capacity, aircraft delay, and airspace interactions.

In 1999, the SFO-Runway Reconfiguration Study examined a series of alternative runway configurations for SFO that could reduce aircraft delay and noise impacts on surrounding residents. SFO currently has two pairs of intersecting parallel runways, and the study identified 32 runway alternatives. Following a thorough technical evaluation, three of these were determined to be worthy of further study and are evaluated in this report. Each alternative improves on the existing airport runway system by increasing capacity, decreasing delays, decreasing noise, and decreasing unnecessary expenditures currently incurred both by passengers and airlines.

One of the studies upon which this report is based is the San Jose International Airport Master Plan Update (SJMP), completed in 1996. Currently there is a single air carrier runway at SJC. The SJMP provides for the addition of a second air carrier parallel runway (now under construction), which will give the airport a dual dependent runway system and increased capacity.

At Oakland Metropolitan International Airport (OAK), studies of the runway system have also identified alternatives for expansion of air carrier capacity. OAK currently has a single air carrier runway in the South Field, although a second runway in the North Field (27R) is sometimes used for air carrier landings only. Two alternatives have been identified for the addition of a new parallel runway in the South Field.

The analysis in this report will consider the three runway alternatives identified for SFO, the two alternatives for adding a runway at OAK, and the additional runway under construction at SJC. Combinations of these alternatives give a variety of different runway capacities for the three airports and for the Bay Area as a whole. They also create different air route interactions that are analyzed for their impacts on airspace capacity.

1.2 OBJECTIVES

This report provides an assessment of how well the commercial carrier airport runways and Bay Area airspace will accommodate projected demand over the next 20 years from 2000 to 2020, primarily by estimating average aircraft delay. The key questions to be answered include the following:

- What happens if the airports “do nothing” or do not improve runway capacity?
- What are the effects of “demand management” strategies on projected delays?
- What are the impacts of new air traffic control technologies?
- What are the effects of the different runway reconfigurations at SFO?
- What are the effects of adding a new runway at OAK?
- What are the effects of the new commercial air carrier runway under construction at SJC?
- What is the overall effect on the Bay Area of different combinations of the SFO, OAK and SJC runways?

1.3 MODELING SOFTWARE

The primary tool used in this analysis is SIMMOD, an advanced computer simulation program approved by the FAA for modeling runway systems and airspace interactions. The computer simulation model captures the interactions between runways at the three airports and the applicable airspace procedures, thus assessing how existing and proposed runways will handle the forecasted level of aircraft operations in the future.

SIMMOD quantifies airport and airspace capacity data; it does this by measuring delay incurred by aircraft. Average delay per aircraft arrival or departure varies between the different runway alternatives, and hence is a measure of the efficiency of the alternative runway systems proposed. In addition to testing the runway alternatives, several operational variations, or “sensitivity tests” have been run to measure the impact of modifying air traffic levels through regulatory means (demand management) and introducing new air traffic control (ATC) technologies and operating procedures.

1.4 REPORT ORGANIZATION

This report is presented in a parallel manner to the work process as follows:

- Section 1, *Introduction*, outlines the study background, objective, and organization of the report.
- Section 2, *Study methodology*, presents the work process, describes the simulation software, defines ultimate and practical capacity, and discusses key variables affecting airspace and airfield capacity and delay.
- Section 3, *Existing Delays at Bay Area Airports*, illustrates existing runway layouts, presents delay and capacity results from SIMMOD, and validates the SIMMOD model for existing conditions at the three Bay Area airports.
- Section 4, *Managing Demand to Accommodate Future Traffic with Existing Runways*, presents the impact of introducing demand management techniques at SFO, as well as the benefits of air traffic control technology enhancements.
- Section 5, *Adding New Area Runways to Accommodate Future Traffic*, analyzes new runway alternatives for SFO and OAK, and presents the SIMMOD delay and capacity results for years 2010 and 2020.
- Section 6, *Comparison of Delay and Capacity for All Alternatives*, tabulates years 2010 and 2020 results for various scenarios and highlights key differences.